

American Cinematographer

Published by the American Society of Cinematographers, Inc.



Announcement of New PROJECTION DEPARTMENT

(See Page Four)

PUBLISHED IN HOLLYWOOD CALIFORNIA

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TITLE

PHOTOGRAPHED BY

A Sainted Devil
The House of Youth
The Law and the Lady
Trigger Fingers
Forbidden Paradise
Her Night of Romance
The Siren of Seville
Wages of Virtue
Daughters of the Night
The Mad Whirl
The White Sheep

Greed
Broken Laws
Sundown
Smouldering Fires
North of 36
The Dark Swan
The Ancient Law
The Roughneck
Unmarried Wives
The Legend of Hollywood
Romola
Love's Wilderness
The Foolish Virgin
Secrets of the Night
Idle Tongues
Women First
Comin' Through the Rye
Troubles of a Bride
Battling Bunyan
On Probation
On the Stroke of Three

Harry Fischbeck, member A. S. C.
J. O. Taylor
Not credited
Walter Griffin, member A. S. C.
Charles Van Enger, member A. S. C.
Ray Binger and Victor Milner, member A.S.C.
Sol Polito, member A. S. C.
George Webber
Not credited
Merritt Gerstad
Floyd Jackman, member A. S. C. and
Geo. Stevens
Ben Reynolds and Wm. H. Daniels
J. R. Diamond
David Thompson
Jackson J. Rose, member A. S. C.
Alfred Gilks, member A. S. C.
David Abel, member A. S. C.
Not credited
George Schneiderman, member A. S. C.
Jack McKenzie
Karl Struss
Roy Overbaugh, member A. S. C.
Oliver Marsh
Norbert Brodin, member A. S. C.
Gilbert Warrenton, member A. S. C.
Karl Struss
Allen Thompson
Not credited
Not credited
Frank Cotner
Ernest Miller
Victor Milner and Paul Perry, members A.S.C.

American Cinematographer

FOSTER GORE, *Editor and Business Manager*

Board of Editors—VICTOR MILNER, H. LYMAN BROMBERG, KARE BROWN, PHILIP H. WHITMAN

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A. S. C. ROSTER	



NEXT MONTH

¶ HERFORD TYNES COWLING, A. S. C., will report on motion picture production conditions in China and the Far East as he found them through first-hand study in his recent "cinematographic" trip around the world.

¶ BERT GLENNON, A. S. C., will write on what the cinematographer expects in the way of progress in lenses.—and there will be the new projection department and other features.

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American Cinematographer to Have Projection Department as Regular Part of Each Issue

Mutual Interests of Projectionists and Cinematographers Seen by the A. S. C.



Publication of Practical Information to be Criterion of New Department.



EARL J. DENISON

A projection department is to be made a regular part of the *American Cinematographer*.

This announcement, together with the attendant one that Earl J. Denison will be in charge of the department, is one of the most important to be made in the history of this publication, and comes as the realization of an ambition that has been cherished for several years by the American Society of Cinematographers, publishers of this journal.

In the fall of the closing year it was decided by the A. S. C. membership that the time had come for the establishment of a projection department, and, accordingly, a special committee of A. S. C. members comprising Dan Clark, George Schneiderman and Gil-

bert Warrenton was appointed to work in conjunction with the regular editorial staff to carry out the wishes of the A. S. C. membership in making the department a regular part of the *American Cinematographer*. This conclusion was arrived at by the American Society of Cinematographers after long and mature contemplation, by virtue of which the fact was driven home that, in order to have the perfect screen presentation, the closest possible relationship must exist between the projectionist and the cinematographer.

Projection Is Decisive

How to bring about this mutual bond of interest was long considered before the conviction began to grow that the most logical way to produce the desired results was through the medium of the Society's publication itself. A better understanding of reciprocal problems of projection and of cinematography is sure to attain the goal toward which both the cinematographer and the projectionist are bending their efforts, and that, of course, is the perfect screen presentation. The Society believes that the establishment of this department will not only be of interest to the projectionist and to the cinematographer, but should prove of indirect benefit, if it cannot be seen to be direct, to every one concerned in the production of a motion picture, for the reason that the efforts of all, in the final analysis, are ruled by the screen presentation—in other words, how the public sees the picture.

Workable Information

It is the plan to make the new department the embodiment of simplicity, to avoid being forbiddingly technical, and, above all, to make it practical.

Headed by Denison

With this ideal in mind, the A. S. C. believes that it is fortunate to have the ideal man to handle the department in the person of Earl J. Denison.

(Continued on page 17)

Photographing "North of 36"

By Al Gilks, A. S. C.

Texas Plains Hot Enough
to Melt Lenses as Big
Production is Filmed

To handle the camera on "North of 36" called for something in the nature of a cross between a cinematographer and a cowpuncher. As is generally known this Paramount production, which was directed by Irvin Willat, was filmed in its natural locale—which meant pure location work under a broiling Texas sun from the start until the finish of the vehicle. The ten weeks of location served to thoroughly ground us in the fundamentals of the cow country, not the least of our learning being to live "close to the plains", at the same time being obliged to successfully cope with, despite numerous obstacles, the difficulties that challenged us to bring good camera work to the screen despite the conditions that surrounded us.

In short, we were living the life of the first part of the last quarter of the last century—yet we were setting out to provide entertainment and education through the medium of one of the most modern of inventions.

"North of 36" was strictly a location picture, so to speak. In the two and one-half months that we galloped over the Texas plains, sometimes shooting from a lofty platform and at other times from the lurching floor of a floating wagon, we were not only living under primitive conditions but, cinematographically, we were photographing under like circumstances. We had to depend on Nature, with its own light sources, to aid us photographically rather than to call in the artifi-



AL GILKS, A. S. C.

cial lights which have so revolutionized studio cinematography. We had to have our own laboratory unit on the field, necessarily without the facilities common to such a production center as Hollywood. But the entire under-

taking was met by the company as a whole with a fortitude that made possible the results that bespeak for themselves.

A major part of "North of 36" relates to the drive of the long horn cattle, fractious beasts from whom every precaution had to be taken to conceal the cameras. But we had to be polite to the long horns, especially since they were the only herd that the very active efforts of the Paramount organization could find in the length and breadth of the land.

Letter after letter and telegram after telegram went to the stockyards and cattle-raisers, inquiring if a herd of such a breed was available. The answer in each case was in the negative.

Just when things looked blackest we received word from James East, who was aiding us in our search, that after weeks of hunting through Old Mexico and southern United States, he had located a herd of four thousand long-horns on an immense ranch about thirty miles out of Houston, Texas.

By a coincidence, this herd was on almost the exact locale of the story as Emerson Hough wrote it and men from our location department immediately left for Houston to look over the grounds and arrange the final details.

It was the first long-horn drive in almost thirty-five years and according to the owner of the cattle, Bassett Blakeley, there will never be another. Mr. Blakeley plans



A triple-deck platform used to support cameras in filming action centering around cattle in "North of 36."



Camouflaging the camera from the cattle while bit of action with Ernest Torrence is filmed

to ship the cattle to market and replace them with a more modern breed.

The drive in itself was an exact replica of the many which took place in southwestern United States during the 1866-75 period. In it there were over four thousand long-horn steers, three covered ox carts, thirty-two expert cow-punchers, and four men equipment and cooking. Strung out, they covered a distance of over four miles.

The cattle were driven over parts of the old Texas-Kansas Cattle trails and the routine on the trip was practically the same as if it had been a

real pioneer drive.

According to the group of cattle-men who served in an advisory capacity for the trip and who have been over the old trails dozens of times, the herds in the early days traveled at a rate of from twenty to thirty miles per day for the first week of the journey. Later, when the animals became tired, twelve to fifteen miles per day was considered good time. This same rate of speed was made by the Paramount company while filming the picture.

The daily routine also was similar to the scheduled on one of the early drives, which

was:

1. Graze morning until noon.
2. March until twilight.
3. Halt for another graze until dark.

While the herd was feeding in morning the company shot scenes of the players around the camp. From noon until twilight scenes were taken of the cattle and of the wagons and people on the march. When the troupe halted for the twilight graze, scenes of making camp and of the cowboys milking around the herd were taken.

(Continued on page 19)

Here's What Helen Klumph Thinks of A.S.C. Member's Cinematography

¶ In the December 16th, 1924, drama section of the Los Angeles Times, of which Erwin Schnallert is drama and music editor, Helen Klumph, in an exclusive New York dispatch, had the following to say of the cinematography of Alfred Gilks, A. S. C., in "North of 36": "Needless to say, Victor Milner, secretary of the American Society of Cinematographers, immediately wrote Miss Klumph as to the identity of the man who photographed "North of 36."

"At the Rivoli this week we have another stampede. 'North of 36' is the picture . . .

"If I could only remember the name of the cameraman who shot this picture I would like to send him a large bouquet. So far as I am concerned, he ranks with the immortals for having caught the lyric beauty of cloud-kung Texas skies. He seemed to be able to catch heat and cold and all sorts of atmospheric subtleties in his photography."

Camera Review of the Last Year



A. S. C. Members Make Great
Contribution in Field of
Cinematographic Progress

(The following article was originally written by the editor of this publication for the EXHIBITORS HERALD, in which it appeared as a brief and sketchy review of cinematography in 1924.)

A resume of the cinematography of 1924 probably will not, in general, reveal any startling changes from that of 1923. Yet there have been such changes and improvements, as imperceptible as they might be as over last year. The progress of cinematography has been gradual, though rapid; and the contrast only asserts itself when present photography is compared with that of two or three years ago.

In addition to the evolutionary improvement that was manifested throughout the field of cinematography, the closing year saw photographic achievements that crystalized, in a vivid way, the advancement of the art of the camera since the advent of practical motion pictures.

Douglas Fairbanks' "The Thief of Bagdad" demonstrated what a flexible thing cinematography is, and drove home its importance to the layman who, for some inexplicable reason, has always accepted its rapid strides as a matter of fact. But just as the story of "Bagdad" itself intrigued the imagination, the cinematography therein did likewise, for the reason that both were so greatly predicated on each other.

Aside from its other ramifications, this production of Fairbanks was an irrefutable contribution to the science of cinematography. It threw off a restraint born of timidity in production matters, and conjured a confidence for others to avail themselves of the fullness of a science which, like electricity, apparently has more before it than behind it. Let it be said that in encouraging cinematography, the producer is broadening the present and the future of the industry itself, for, without being committed to an ambiguity, the picture is necessarily circumscribed by moving pictures.

Too much credit cannot be given to the

men responsible for the cinematography in "The Thief of Bagdad"—namely Arthtur Edson, staff cinematographer for Fairbanks, and Philip H. Whitman and Kenneth MacLean, who worked with him on the special effects. All three are members of the American Society of Cinematographers.

Another of the 1924 creations in cinematography which should graphically appeal to the popular mind is "The Lost World," which First National is producing by arrangement with Watterson R. Rothacker. Speaking conservatively, this production should prove epoch-making. It is distinctly a "photographic picture." It opens up a vista, the like of which has always been shrouded except for the highly imaginative pen. Arthur Edson handled the dramatic filming in this production also, and First National evidently thought so much of its possibilities that they induced Fred W. Jackman to leave the directorial fold long enough to supervise the photographing of its special effects. With him were associated Homer Scott and J. D. Jennings. All are members of the American Society of Cinematographers.

Space could be consumed indefinitely in enumerating the meritorious cinematographic efforts of the past year, but let it suffice to mention those which have appealed and will appeal most to the exhibitors' enigmatic patrons. In this regard, however, it might be well to recall "The Ten Commandments" which, though it should be properly classified with the previous year, was so revolutionary cinematographically that its results are still being felt. It was photographed by Bert Glennon, a member of the American Society of Cinematographers.

Color cinematography, through Paramount's production of "The Wanderer of the Wasteland," caused critics and public alike to enthuse, but the widespread adoption of color is still a matter for the future to decide.



Paul Perry, A. S. C., before he departed to Arizona with Bert Glennon, A. S. C., on the deer drive location trip, had just returned from a lengthy location jaunt into the Northwest with Douglas MacLean productions.

George Barnes, A. S. C., is finishing the camera work on the Cosmopolitan production, "Zander the Great," which, starring Marion Davies, is being made at the United Studios, Hollywood.

H. Lyman Broening, A. S. C., has completed the cinematography on the latest Erb production made at the F. B. O. studios, Hollywood.

Reginald Lyons, A. S. C., will leave shortly on a vacation trip to San Francisco. Is the rumor true that Reggie is about to add some more foreign cars to his string?

Stephen S. Norton, A. S. C., has been entrusted with important set-ups on the big scenes in "The Phantom of the Opera," which Charles Van Enger is filming for Universal.

Frank B. Good, A. S. C., is filming the latest John M. Stahl production at the Metro-Goldwyn-Mayer studios, Culver City. Harry Harts, one of Frank's proteges of the roaring road, drove a daredevil race and ran away with second money at the recent big automobile race at Culver City.

King Gray, A. S. C., has been doing some speedy work on "Speed," which Edward Le Saint is directing at the F. B. O. studios. King called in Hans Koenekamp, A. S. C., for an extra set-up on some of the big passages of the production.

Robert Kurlle, A. S. C., is completing the cinematography on Henry King's latest production which is being filmed at the United Studios.

Kenneth McLean, A. S. C., has returned to Hollywood from Rome where he did special effect work for the Metro-Goldwyn-Mayer production, "Ben Hur."

Victor Milner, A. S. C., has finished Paramount's "East of Suez," starring Pola Negri and directed by R. A. Walsh.

Floyd Jackman, A. S. C., drops a note from Moapa, Nev., lauding the beauties of the desert and the mountains in Nevada and Utah where he is filming scenes for "Rex, the Wild Stallion," the latest production of Fred Jackman, A. S. C., for the Hal E. Roach studios.

"We have had," Floyd writes, "almost every known variety of weather, sometimes all in the same day. Crawling out of your tent and breaking the ice on the water is great sport—maybe, but it surely drives the sleep out of your eyes."

Faxon Dens, A. S. C., is in Birmingham, Ala., for the filming of location scenes for the latest Thomas Meighan production for Paramount. With him is Philip H. Whitman, A. S. C. Production headquarters on the Meighan picture are in New York City.

Herford Tynes Cowling, A. S. C., having returned from his latest swing around the globe, is now in Chicago, where are located the headquarters of Round-the-World Travel Pictures.

Dan Clark, A. S. C., is shooting a lot of frills and furbelows these days since "Dick Turpin," the latest Tom Mix vehicle for Fox, is in the nature of a costume production. J. G. Blystone is directing and Katherine Meyers is leading lady.

Ernest Haller, A. S. C., is finishing the cinematography on "Parsian Nights," a Gothic production directed by Al Santell. The cast includes Lou Tellegen, Elaine Hammerstein, Rene Adoree and Gaston Glass.

Al Gilks, A. S. C., has begun work on "The Air Mail," Irvin Willat's next production for Paramount, the story being by Byron Morgan. The cast includes Billie Dove and Warner Baxter. Al has about ten day's work around the air mail hangars at Reno, Nev., after which he goes to the "ghost city" of Rhyolite, Nev., where two or three weeks will be spent "camping" in one of the deserted school buildings in the town.

Mitchell Cameras, Equipment Go to Studios in Germany

American cameras and equipment will go to one of the most important producing centers on continental Europe as the result of a \$10,000 deal consummated between the Mitchell Camera Corporation, of Hollywood, and the German producing organization, Ufa Films, of Berlin.

During the past month arrangements were concluded between Henry Boeger, of the Mitchell company, and representatives of the German producers whereby the Mitchell outfits will enter the German studios.

The outfits include two camera units with all built-in features, ten magazines, two universal finders, two extension arms, two matte cutters, two sunshades, two tripod bases, two tripod heads, two camera cases, three magazine cases, two baby tripods and two Gimbal tripods.

Value of Modern 'Lab' Equipment is Stressed

A heavy outlay in the installation of automatic laboratory machinery in the plants of the Consolidated Film Industries, Inc., was announced this month by H. M. Goetz, vice president of the organization. Consolidated which combined the resources of four leading laboratories, has spent many thousands of dollars on research and experimentation, and has perfected the methods of processes of every department, Goetz announces.

Commenting on the operation of the newly installed machinery, Goetz emphasized the value of well-made release prints.

"Few people," he said, "not intimately acquainted with motion picture technique realize the remarkable fact that more than 100,000 separate little pictures, or 'frames' as they are called, are flashed on the screen in one average length photoplay.

"It is impossible to attain the accuracy necessary for the successful reproduction of



H. M. Goetz

the wealth of detail comprised in each of these little 'frames' by antiquated methods.

"Only those familiar with the technical details of this highly specialized branch of motion picture industry understand the complexity of the daily task confronting manufacturers of motion picture prints.

"The size of the average picture projected in the larger theatres may be more than

40,000 times that of the original appearing on the film, and the slightest blemish or east imperfection—unnoticeable often to the naked eye—will stand out very plainly when undergoing such great magnification.

"To avoid all such defects which greatly hinder the perfect reproduction of the photographic beauty of a picture it is essential to provide ideal atmosphere and temperature where the film is treated and handled. At the Consolidated plants the air throughout is cleansed and moistened in a series of special processes and the proper even temperature is maintained under a system of automatic control that insures perfection.

"Similar care must be taken in the matter of lighting and in the quality of the chemicals used and the purity of the water. It is on account of the careful attention to these details in every department that Consolidated vouches for satisfaction in every release print."

HAVING BEEN DURING THE PAST MONTH IN HIS NATIVE SOUTH FOR THE FILMING, IN BIRMINGHAM, ALABAMA, OF LOCATION SCENES WITH FAXON DEAN, A. S. C., PHILIP H. WHITMAN WAS UNABLE TO REPORT NEW YORK'S CINEMATOGRAPHIC LATEST; HENCE MANHATTAN MUTTERINGS MUST GO UNMUMBLED THIS MONTH.

The Editors' Lens - - - - focused by FOSTER GOSS

Encouragement and Cinematography

¶ To Rafael Sabatini, as the winner, and to Adolph Zukor, as the donor, of the \$10,000 award for the best motion picture story of the 1923-24 season, the *American Cinematographer* pays its respects—to Mr. Sabatini for his ability to write such a story as "Scaramouche"; and to Mr. Zukor, for the plan of the prize in the first place. Incidentally, the American Society of Cinematographers may justly be proud of the fact that the screen version of the Sabatini story was filmed by John F. Seitz, chief cinematographer for Rex Ingram, and Victor Milner, Seitz's associate on the production. Both are members of the A. S. C.

¶ We would not for a minute take the negative side of the proposition that "the play is the thing," but rejoice in the initiative and the generosity, as displayed by Mr. Zukor, that has given Mr. Sabatini's genius a reward that it so richly deserves. But it does seem passing strange—with no intent to cast aspersions in any direction—that nothing in the nature of an award similar to that of Mr. Zukor has ever been so handsomely proffered encourage the most fundamental thing about motion pictures—namely, cinematography.

¶ It is not carping to point out, and we do so without apology, that a great screen story like Sabatini's "Scaramouche" would be useless for effective screen purposes if it were not for the tremendous strides that cinematography has made—without any extrinsic encouragement whatsoever. It does appear paradoxical that nothing has been done in the way of the Zukor award to spur on cinematography—which must, being basic, define, in the future as in the past, the limits of maximum motion picture effort.

Mutual Goal

¶ The announcement, in other pages of this issue, of the projection department that is to be made a part of this publication is one which the *American Cinematographer* has been looking forward to for a great many moons.

¶ This journal, in common with cinematographers as a whole, has always realized the importance of the projectionist. He is one of the strongest—one of the most decisive—links in the whole great chain of the picture that begins with the camera and ends on the screen. His is the responsibility of whether or not the work of the director, the player and the cinematographer, the money and care spent by the producer, are to be represented on the screen in their true values.

¶ Without efficient projection, every one's efforts fall short, no matter how nearly perfect they may have been in the inception.

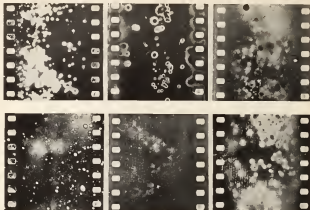
¶ It is only natural then that a close relationship between the projectionist and the cinematographer must redound to the benefit of all concerned—director, player, producer, every one. Working toward a mutual goal—the perfect screen presentation—these two great divisions of the art can be of even greater service than they heretofore have been, even though their strivings have gone by comparatively unnoticed.

¶ The *American Cinematographer* believes that it has taken a logical step in making its pages of interest to the projectionist as well as to the cinematographer. So does it also believe that, in the person of Mr. Earl J. Denison, it has been able to obtain the logical man to handle such a department. Mr. Denison knows the theory of his profession, but above all he is *practical*, being constantly active in his chosen line of work, and, being so, knows projectionists and practical projection.

Markings on Film From Drops of Water

By J. I. Crabtree and
G. E. Mathews
Eastman Research Laboratories

From Transactions
Society of Motion
Picture Engineers



When droplets of water come into contact with motion-picture film either before or after the film is exposed and previous to development, spots are formed which later appear as objectionable defects on the film. Markings are also apt to be produced if all superfluous moisture is not removed from the film before drying or if the rate of drying is changed during the progress of drying. Moisture spots are always produced on the emulsion side of motion picture film and never on the base side, since the film is resistant to moisture.

To date, little has been known regarding the various factors which affect the nature of the markings produced in the above manner. This work was undertaken in order to study these factors, and prepare a classified index of the various markings which would serve as a source of reference for the identification of spots and markings of unknown origin.

Water markings may be of the following types:

A. Markings produced previous to develop-

ment and caused by:

1. Water accidentally touching the film.
2. Condensation of water vapor from humid atmospheres.

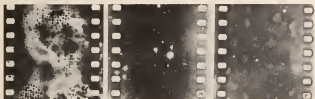
B. Markings produced after development and fixation and caused by:

Abnormal drying conditions.

FACTORS INFLUENCING THE FORMATION OF MOISTURE MARKINGS

1. *Markings Produced Previous to Development By Drops of Water.*

Experimental Procedure.—Three emulsions were used in the tests; Eastman Motion Picture Negative (no backing), Eastman Super-speed Motion Picture Negative (no backing), and Eastman Regular Motion Picture Negative film. The normal treatment consisted in either (a) spraying the emulsion side of the film with a small hand atomizer which delivered a fine spray evenly distributed over the area toward which it was directed or (b) covering the emulsion side with a layer of moist cheese-cloth for two minutes so as to produce



MARKINGS CAUSED BY DROPS OF WATER

No.	Marking	Treatment	Time and Temperature of Storage before Development	Emulsion
1.	White spots with hazily defined edges	Exposed before spraying with atomizer	1 wk 110° F.	Positive
2.	White spots, black center or gray spots with black nodules and white halo	Exposed before spraying with atomizer	1 wk 110° F.	Negative
3.	Black spots	Exposed before spraying with atomizer	2 days 110° F.	Superspeed Negative
4.	White spots, black halo	Exposed before spraying with atomizer	1 wk 110° F.	Positive
5.	White impression of cloth	Exposed before impressing with moist cloth	1 wk 60° F.	Superspeed Negative
6.	White impression of cloth	Exposed before impressing with moist cloth	1 wk 110° F.	Superspeed Negative
7.	Black impression of cloth (reversed image)	Exposed before impressing with moist cloth	1 wk 110° F.	Positive

(Numbers 6 and 7 show the effect of increasing the temperature.)

The above examples are typical and not peculiar to the emulsions indicated. Under favorable conditions any type of marking may be produced on any emulsion.

MARKINGS CAUSED BY CONDENSED WATER VAPOR

8.	Small white spots	Exposed before humidifying	1 wk 60° F.	Negative
9.	Mottled spots	Exposed before humidifying	48 hrs. at 42° F.	Negative
10.	Serrated edged spots	Exposed after humidifying	1 wk. at 110° F. 24 hrs. at 42° F. 24 hrs. at 110° F.	Negative

MARKINGS CAUSED BY ABNORMAL DRYING CONDITIONS

		Drying Conditions	
11.	Spots with dark narrow outlines	Drops of water on emulsion	One-half hr. to one hr. at 60° F.
12.	Dark gray spots, white centers	Drops of water on emulsion	30 minutes at 90° F.
13.	Hazy white spots	Drops of water on emulsion. Developed and fixed at 50° F. Washed 25 minutes at 30° F.	25 minutes at 110° F.
14.	Streaks	Drops of water on emulsion. Carefully wiped	30 minutes at 90° F.
15.	Spots with hazy gray halos	Drop of water on base side	30 minutes at 90° F.

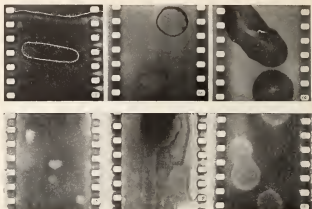
a uniform moisture pattern. The order of exposure relative to the moisture treatment was as follows:

1. Unexposed before moisture treatment.

2. Exposed before moisture treatment.

3. Exposed after moisture treatment.

When exposing, the film was flashed so as to produce an average density of 0.8 after



development. Four foot lengths of film were used and, after the moisture treatment, these were wound on wooden film spools, and tightly sealed in film cans of 200 foot capacity. Two samples were placed in each can, one to be developed at the end of two days and the other after one week. Duplicate sets were made up, one being maintained at room temperature (68° F.) and the other at a tropical temperature (115° F.). The film samples were developed in the usual manner.

FACTORS AFFECTING NATURE OF MARKINGS

1. *The Nature and Age of Emulsion.*—Of the three emulsions examined, the positive showed a somewhat greater sensitiveness to moisture than the negative emulsions, but emulsions two years old showed only a slightly greater propensity to give markings than new emulsions.

2. *Temperature.*—When the emulsions were subjected to an increased temperature after the moisture treatment, the number and extent of the markings were very noticeably increased. No new markings were observed at the higher temperatures.

3. *Nature of Support.*—In order to determine whether the nature of the support on which the emulsion was coated influenced the mark-

ings in any way, parallel experiments were made with new and old emulsions coated on glass plates and on film support, but no difference either in the number or appearance of the markings on the various supports was noticed.

NOTE.—On examining the gelatine coating of the glass plates by reflected light after removing from the wash water preparatory to drying, tiny pits or indentations were observed which coincided exactly with the markings as seen by transmitted light.

4. *Order of Exposure.*—Markings produced on film before treatment as compared with those on unexposed film were similar in general appearance, though the background of uniform density produced by exposing (flashing) served to increase the visibility of the markings.

Exposing the film after the moisture treatment appeared to make the markings slightly more pronounced; which may have been a result of the lens-like nature of the drops of water.

5. *Time Exposure to Moisture before Development.*—In general, more markings were observed on film which was allowed to remain

(Continued on page 20)



CONSOLIDATED CERTIFIED PRINTS

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(Continued from page 4)

By Arrangement with F. P. L.

Mr. Denison is motion picture engineer in charge of projection with the Famous Players-Lasky Corporation, by arrangement with which, the A. S. C. is able to have Mr. Denison take charge of the new department.

Began as Projectionist

Like several A. S. C. members themselves, Mr. Denison started in the business as a projectionist. That was in 1906 and from that time until 1909 he was regularly employed as such. He then took up special lines of work in connection with projection including experiments on one of the first talking pictures which he also demonstrated in several cities. He invented and patented several devices used in connection with projection, splicing and handling motion picture film.

From 1912 to 1913 he managed a commercial film laboratory and projection equipment establishment in Chicago. He operated one of the first commercial film renovating plants in the United States.

From 1914 to 1917 he specialized in projection room construction, and the equipment of the same. In 1918 he was sent to France as field supervisor for the community motion picture bureau which was in charge of the exhibition of motion pictures for the U. S. Government. He was subsequently transferred to Italy as director of motion picture entertainment for the A. E. F.

Six Years

It was in 1919 that Mr. Denison joined the Famous Players-Lasky Corporation as motion picture engineer in charge of projection and physical handling of prints in exchanges, there being now 40 of the latter in the various key cities. During the six years that he has been affiliated with Famous Players-Lasky, Mr. Denison has completely revolutionized the splicing and handling of prints in the exchanges, and has standardized the inspection, splicing and projection room equipment. He has invented and perfected a number of devices now in use by the Paramount organization in connection with inspection, splicing and projection of film. He inspected hundreds of projectors throughout the country

in investigating the causes of film damage.

In Touch with Projectionists

Mr. Denison covers the 40 key cities at least once each year, visiting and consulting with a great number of projectionists with whom he is in constant personal touch in a practical way. He has spent two years in the laboratories in New York and Hollywood and is responsible for several improvements pertaining to the handling of release prints in laboratories. He revolutionized studio and laboratory projection. He is constantly engaged in research work both in field and laboratory regarding projection and film damage. He specified all projection equipment in the big new laboratory in the Famous Players-Lasky laboratory in Hollywood. Mr. Denison was in charge of installation of projection equipment in the homes of foremost directors and celebrities, besides having directed the motion picture entertainment of some of the most fashionable social functions in the country. He is the author of several booklets on film and projection which have been distributed all over the world. He produced several slow-motion pictures showing the action of film in projectors, etc.

Mr. Denison is an active member of the Society of Motion Picture Engineers (S. M. P. E.), membership in which is only obtainable on the strength of certain accomplishments in the motion picture industry. He is, besides being in constant touch with projectionists, likewise in touch with cinematographers, directors and theatre and exchange managers, spending at least eight months of the year in the field.

New Bell and Howell Model Is Exhibited at A. S. C. Open Meeting

Members of the American Society of Cinematographers were given an opportunity to view the new Bell & Howell camera when the new professional model was placed on inspection at the A. S. C. open meeting of December 29th, held in the Society's headquarters in the Guaranty Building.

The instrument was in charge of G. R. Richards, Hollywood representative of the Bell & Howell Company, and was the center of interest of the A. S. C. members present at the meeting.

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PHOTOGRAPHING "NORTH OF 36"

(Continued from page 6)

As everyone knows, cow-boys on guard spend the night in the saddle. During the drive for the motion picture, this also was done, not in an attempt to imitate the old cattle drives to that extent, but rather because of necessity. With the four thousand long-horns used in the film there was just as much chance, just as much danger, of an uncalled for stampede as there was fifty or sixty years ago. According to several of the two hundred and fifty cattle men who attended the start of the journey in the filming of the motion picture, the four thousand long-horns were about the wildest animals any of them had ever seen.

In this night watch everybody in the company took part — Jack Holt, Ernest Torrence and Noah Beery, as well as the minor players. Each was given a shift of a certain number of hours.

Three of the many interesting scenes which occurred during this drive were a river fording scene and two stampedes.

The fording scene is one of the most vivid shots of the entire production. Flanked on each side by sixteen cow-

boys and led by Alamo, the oldest long-horn in existence, the four thousand cattle swam across a river almost half a mile wide. Closely following them were the three covered wagons, containing the women, being towed across by six span of oxen. The entire scene was taken without a loss of life or an injury either to the men, the horses or the cattle.

Even Producer Irvin Willat, a former cameraman, who from the success of his productions for Paramount including "Heritage of the Desert" and "Wanderer of the Wasteland", has a reputation of making thrilling as well as beautiful scenes, said it was one of the most vivid sequences he has ever produced.

Technical directors and chief carpenters left in advance of the company to start construction on the buildings. On nearly all location trips most of the carpenters are hired locally.

The carpenters on "North of 36" had two jobs. One was to arrange for the accommodation of the huge company of players and staff. The other was to build sets for the picture.

For the housing of the people two twenty-five room

ranchhouses were selected. Added to these two dozen army tents were erected for sleeping quarters and additional buildings were thrown up for the saddle house, the horse-stable, the mess-halls, the laboratory, the power house and the property rooms.

The production sets required even more work. Aside from the minor buildings an entire town, an exact replica of the old cattle village of Abilene, Kansas, had to be erected. This town, copied from engravings and sketches in books and newspapers and from information obtained from early Kansas settlers, included a hotel, hardware store, livery stable, cattle pens, railroad depot, saloon, dancehall, general store, black-smith shop and a dozen residence houses. Each house and store in the picture is an exact duplicate of the original building in old Abilene.

In addition to the featured players we carried forty real cow-men of proven ability as actors. Fortunately we arrived in Houston at the time a gigantic rodeo was taking place and from this rodeo we obtained some of the best riding and steer-roping talent on the entire North American continent.

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MARKINGS ON FILM FROM DROPS OF WATER

(Continued from page 14)

undeveloped for a week after the moisture treatment than on film developed two days after the treatment.

A2. Markings Produced Previous to Development caused by Condensation of Water Vapor from Humid Atmospheres.

Film is often subjected to humid conditions with resulting absorption of water vapor. If the film is suddenly transferred from a warm atmosphere to a cold atmosphere, condensation occurs on the surface of the film and tiny droplets of moisture are formed which may produce markings on the developed film.

Experimental Procedure.—The tests were divided into three groups: (1) Humidification at room temperature, (2) humidification at tropical temperatures (100-110° F.), and (3) sudden changes from low temperatures to tropical temperatures and *vice versa*. For the experiments, special humidors were constructed, consisting of two motion picture film cans (200 foot capacity) soldered bottom to bottom. Holes were then punched in the separating wall and just before starting the test, a moist felt pad one foot square was placed in the lower half of the humidor. The film in two or four foot lengths, loosely coiled, was placed in the upper chamber for the test and the cover was then doubly sealed with adhesive.

The film was exposed so as to produce a density of approximately 0.8 after development.

FACTORS INFLUENCING NATURE OF HUMIDITY MARKINGS

1. *Effect of Nature of Emulsion.*—Several new markings were observed under varying conditions of humidification and refrigeration.

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tion with all the emulsions examined. The markings were found to be due to physical conditions to which the film was subjected rather than any inherent chemical nature of the emulsion.

2. *Effect of Order of Exposing.*—In general the spots were more predominant on film which was exposed before humidification than on film exposed after humidification.

3. *Effect of Time and Temperature of Humidification.*—Very few spots were observed on film humidified for one week at room temperature, but at tropical temperatures the number of markings was considerably increased, although only two distinctly different types were observed.

In general the intensity of the markings increased with time of humidification, reaching a limit after a certain time depending on the temperature.

4. *Effect of Sudden Change of Temperature.*—When the film was subjected to sudden changes of temperature, from hot to cold or cold to hot, several types of spots were produced, but these with two exceptions were all similar in character to the spots caused by drops of water described above. The exceptions noted will be discussed later.

To summarize.—No fundamental rule can be given relative to the chance of one or more kinds of spots appearing as the result of the order of exposure under the conditions outlined in Section A1 or A2 but in general all types of moisture markings are slightly more prevalent on film exposed after moisture deposits on the surface than on films exposed after moisture deposition occurs.

Physical conditions to which the film is subjected, such as temperature changes, and the time of contact with moisture before development, are the direct causes of the markings rather than any inherent differences in emulsions or supports on which they are coated.

B. Markings Produced after Fixing and Washing caused by Abnormal Drying Conditions.

After washing, and previous to drying, excess moisture is usually removed from motion picture film either with a cotton swab or chamois by centrifuging, or by means of a blast of air. If the water is incompletely removed, droplets or streaks of water remain on the film and when the film is dried under unfavorable conditions markings appear on the areas previously occupied by the droplets or streaks of water.

Experimental Procedure.—The positive and negative film used for the tests was exposed so as to give density of about 1.0 after development. After thorough washing all excess moisture was carefully removed from the film and then droplets or streaks of water were placed either on the emulsion side or the base side so as to simulate imperfect removal of excess moisture.

For the high temperature drying (90 to 120° F.) a cabinet was used which contained electric heating units and an air blower. Slow drying conditions were secured by the use of a small insulated box in which a pan containing a small volume of water was placed.

In order to study the influence of the degree of tanning of the gelatine on the propensity of the film to give drying marks consecutive samples of film were fixed in (a) 30% plain hypo, (b) an alum-acid fixing bath, and (c) 30% hypo followed by a bath of 2% formaline. The films were also treated for varying times and at varying temperatures during the progress of development, fixation, and washing, so as to produce different degrees of swelling of the gelatine.

The effect of the rate of drying of film treated as above was carefully studied, especially the effect of slow drying in a saturated atmosphere as compared with rapid drying at low humidities.

FACTORS AFFECTING NATURE OF DRYING MARKINGS

1. *The Degree of Swelling of the Gelatine.*—The swelling of the gelatine is governed by (a) the time of immersion of the film in the various photographic solutions and the temperature of the solutions, (b) concentration and composition of the solutions, and (c) the degree of hardening produced by the fixing bath or other hardening baths.

The propensity for drying marks to occur increased with the degree of the swelling of the gelatine, so that in order to reduce the possibility of the formation of drying marks to a minimum, swelling of the gelatine should be prevented by keeping the various developing solutions at a temperature not higher than 70° F. and by the use of a suitable hardening baths, although superhardening of the film should be carefully avoided because this tends to produce brittleness. Prolonged washing at ordinary temperatures does not render the film more susceptible to drying markings.

2. *Methods of Removal of Surplus Water*

Previous to Drying.—Providing all superfluous moisture is removed from both sides of the film previous to drying, the propensity for markings to occur is independent of the method of removing the moisture.

Methods of removal of excess water previous to drying and correct conditions of drying are discussed in a previous paper by one of the authors.¹

3. *The Temperature and the Rate of Drying.*—Markings which are only just visible on the film dried slowly in partially saturated air are objectionably prominent when the film is dried rapidly at high temperatures. Rapid drying, even at normal temperatures, accentuates the markings, but the majority of the drying marks on motion picture film are traceable directly to rapid drying at high temperatures.

If the rate of drying of the film is suddenly changed, once the gelatine coating has commenced to dry at the edges, markings are invariably produced whose contour corresponds with the "shore line" between the wet and dry portions of the film. It is important therefore not to change suddenly the speed of the drying reels, especially when the conditions are favorable for rapid drying.

For details regarding correct conditions for drying, see "The Development of Motion Picture Film by Reel and Tank Systems," by J. I. Crabtree.²

CLASSIFICATION OF MOISTURE SPOTS AND MARKS, WITH A DESCRIPTION OF THE MANNER OF THEIR FORMATION

The markings are listed under three classifications; namely spots and marks caused by (A) actual moisture accidentally touching the film, (B) condensation of water vapor from humid atmospheres, and (C) abnormal drying conditions. The illustrations correspond with the numbers given below.

A. Markings Caused by Actual Moisture Accidentally Touching the Film.

1. *White Spots.*—This type of marking most usually occurs as round or irregularly shaped spots with hazily defined edges, either singly or in clusters. Other varieties are (a) irregular grey areas with white spots scattered throughout, and (b) mottled paces of slightly lighter density than the surrounding film. The latter types were most commonly found on film which had been exposed before the moisture treatment. White spots occur independ-



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¹ *Cinema*, 2:2. Development of Motion Picture Film by Reel and Tank Systems. *Elect. Soc. M. P. Eng.*, No. 16, p. 163 (1923).

² *Cinema*, 2:2. Trans. *Elect. Soc. M. P. Eng.*, No. 46, p. 163 (1923).

ently of the kind of emulsion, although tropical temperatures cause more spots to appear especially on positive film.

2. *White Spots with Black Centres or Grey Spots with a Black Nucleus and a White Halo.*—The most common form is a perfectly round spot, although occasional irregular types were observed as well as group formations of several circular black spots with a large greyish-white halo extending around the entire group. In some cases, the centre is grey instead of black. It was rarely found unless the film had been subjected to tropical temperatures and, in general, the size and number of the markings were greater at the end of one week than after two days under tropical conditions.

3. *Black Spots.*—Although this marking is by no means as common as some of the rest of the film, but occurred frequently on each of the different emulsions tested to justify its inclusion in the classification. It appears as a small round spot of density much darker than the surrounding film and of fairly sharp outline, although variations occur wherein the outline is a hazy dark grey halo, darker than the rest of the film, but occurred frequently on positive film, especially if the film was exposed before the moisture treatment, and accompanied by high temperature conditions. In general, the number of markings increased with the time elapsing between the moisture application and development of the film.

4. *White Spots with Black Rings.*—This marking occurs as a round or irregular white or grey spot with a black or dark grey halo. It resembles a reversal of No. 2. Sometimes the centre of the marking, instead of being clear, contained a small dark spot. The marking was not observed on unexposed film. With both negative emulsions, exposed after the moisture treatment, no markings were found, but on positive film, exposed before the moisture treatment and, especially at tropical temperatures, the spots were very prevalent.

5, 6, 7. *Cheese Cloth Impressions.*—The usual markings produced by impressing moist cheese cloth on any of the three emulsions consist of a white impression of the fabric on a dark background. The order of exposing has little or no effect on the nature of the marking. At room temperature (No. 5) the impressions are far less accentuated than at tropical temperatures (No. 6). Positive film was slightly more sensitive to the impressions than the

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two negative emulsions. A few cases of black impressions of the cheese cloth were noted on film exposed after the moisture treatment, but the greater number of black markings occurred on film exposed before being impressed with the moist cheese cloth (No. 7).

B. *Markings Caused by Condensation of Water Vapor from Humid Atmospheres.*

8. *White Spots.*—The most common marking was a tiny white spot similar in appearance to No. 1, except that it was rarely observed in clusters and seldom in sizes over one-sixteenth inch in diameter. At room temperatures few spots appeared unless the film was permitted to humidify for a week, whereas at tropical temperatures the spots were found in large numbers on film left two days in the humidifier. When the effect of sudden changes of temperature conditions was studied, very few spots were produced unless the film was subjected to at least eight hour's humidification previous to the change to frigid conditions. In every case the markings were more numerous on film which was flashed before the moisture treatment. When the film was refrigerated previous to humidification, the time of refrigeration had little apparent influence on the size and extent of the markings.

9. *Mottled Spots.*—On film which had been subjected to sudden temperature changes, irregular mottled spots were found which were of slightly lighter density inside and slightly heavier density outside than the surrounding film. The marking is vague in outline and hazy in appearance. It was occasionally found with a dark grey spot in the centre. In general, mottled spots occurred more frequently

on film which had been refrigerated previous to humidification. The order of exposure appears to have little influence on the extent of the markings.

10. *Serrated Edged Spots.*—When film is subjected to abnormal humidity conditions so that the condensed moisture is sufficient to render the gelatine mobile, certain specific markings are produced on refrigeration. The most common spot has sharply defined edges deeply serrated with a slightly lighter density just inside the serrations, while the centre of the spot has a density similar to the remainder of the film. When conditions are reversed—that is, refrigeration preliminary to humidification, especially if the refrigeration is short compared with the time in the humidifier—the spots are likewise formed. A few examples were noted on film treated at tropical temperatures, which was exposed after the moisture treatment. The order of exposing the film had only a slight effect on the tendency for the spots to occur.

Miscellaneous Markings.—A few scattered examples of spots similar to Nos. 2 and 3 were noted. These were found chiefly on film which had been exposed and humidified at 110° F. for 48 hours and then refrigerated 24 hours, and in another case where the film had been refrigerated 48 hours and then humidified at 110° F. for one week. In one case where the film had been humidified at 110° F. for 24 hours and subsequently refrigerated 24 hours, there were a great many markings like No. 4. Generally speaking, there were very few examples of markings like those found where actual water comes in contact with the film as mentioned in under A, with the exception of the white spots (No. 1), which is the most common moisture spot observed on motion picture emulsions.

G. Markings Caused by Abnormal Drying Conditions.

Although drying marks are always produced on the emulsion side of film, their formation may be the result of either one or both of the following causes: (a) excess water remaining on the emulsion side of the film (as illustrated in figs. 11, 12, 13 and 14), or (b) excess water left on the base side of the film (as shown in fig. 15). In the latter case the local areas on the emulsion directly opposite the moisture spots on the base side, are cooler than the surrounding film, resulting in a selective drying action, as noted in a recent article

by one of the authors.* The severity of the markings produced by either of the above causes is directly dependent on the temperature and the humidity conditions and on the time of drying.

11. *Spots with Dark Narrow Outlines.*—This marking is distinguished by a dark narrow band, which constitutes the edge of the spot. All the area within this band is of the same density as the rest of the film. It is caused by large droplets of water remaining on the emulsion side.

12. *Dark Grey Spots with Small White Centres.*—When large drops of water are accidentally left on the film which is subjected to rapid drying at high temperatures (90-120° F.), spots are produced whose general density is considerably darker than the surrounding film. The point in the spot where the last water evaporates appears as a tiny white spot. In some cases, a narrow white halo may be found just inside the outer edge of the spot.

13. *Hazy White Spots.*—Occasionally on film which has been developed in solutions at temperatures around 80 deg. F. or over, when the gelatine is in a swollen condition, small vaguely defined white or grey spots are found, especially if the film is dried rapidly at high temperatures (120 deg. F.), even when all superfluous moisture is removed. The markings resemble No. 1, except that the outlines are usually less clearly defined.

14. *Streaks.*—Sometimes streaks remain on the film during drying which causes long string-like grey marks of slightly heavier density than the rest of the film. Variations are found where edges are dark and the side of the streak slightly grey. This marking occurs on film dried either at room or tropical temperatures.

15. *Spots with Grey Halos.*—The most common marking found as a result of the presence of water on the base side of film is a spot with a hazily defined edge or halo of much lighter density than the centre, where the density is nearly the same as the remainder of the film. On film dried at room temperature, this marking is just discernible, but at higher drying temperatures the spots are greatly accentuated. Other varieties are: (1) grey streaks along the edge of the film just inside the perforations as shown in fig. 15, and (2) small round light gray spots even density. All spots caused by water on the base

* *J. Opt. Soc. Am.*, Vol. 14, p. 169 (1923).

side are less distinct than those caused by water on the emulsion side.

From an examination of the various markings produced by moisture, it is seen that there are three essentially different types; namely (1) black spots or local areas of greater density than the surrounding portions, (2) white spots or local areas of lesser density than the surrounding portions, and (3) composite spots (see figs. 2 and 4).

Black spots may be a result either of an increase in sensitivity of the emulsion or of the production of a latent image. It is quite conceivable that when a moistened spot of emulsion is subjected to high temperatures the emulsion becomes "cooked," resulting in an increase in sensitivity. On the other hand, during the progress of drying a moistened spot of emulsion, the grains of the emulsion are subjected to severe stresses, as described by with a dark gray spot in the centre. In general, and such stresses are conceivably sufficient to produce a latent image. Moreover, a displacement of the grains of the emulsion, which occurs during drying, would result in local areas of greater or lesser density on subsequent development.

White spots may be a result either of a decrease in sensitivity or a destruction of the latent image. E. Cousin⁶ ascribes the cause of moisture markings produced by touching an unexposed photographic plate with the end of a dampened stirring rod to a loss of sensitivity of the region affected. The possible destruction of the latent image might be ascribed at first thought to the possible decomposition products of the film support, but definite experiments as outlined above showed that spots of identical nature were obtained with emulsions coated both on glass and on film supports.

Black and white spots may be a result of bacterial action. Further experiments relating to bacterial markings are in progress.

That the same substance (water) should at the same time cause black spots and white spots is difficult to explain.

Drying markings are undoubtedly a result of displacement of the silver grains in the developed emulsion from their original position, as explained by Sheppard and Elliott⁷ and E. Senior.⁸

Markings are produced on exposed and unexposed motion picture film by water, either in form of actual drops or condensed when it is transferred from a warm to a cold saturated atmosphere. Water markings

can also be produced on developed motion picture film during drying if drops or local areas of water remain on either side of the film, which is then dried rapidly at a relatively high temperature and low humidity. Drying marks are also produced even if the surface of the film is free from drops of water if the drying of the film is suddenly changed during the progress of drying.

Moisture markings are most generally the result of localized physical stresses set up in the gelatine layer rather than of chemical action.

It is important, therefore, to preserve unexposed motion picture film in a relatively dry atmosphere and at a relatively low temperature, although the effect of high temperatures is somewhat nullified in the absence of moisture. It is dangerous to suddenly transfer film which has been freely exposed to a hot humid atmosphere to a cold saturated atmosphere in view of the possibility of the condensation of moisture on the emulsion.

On leaving the factory motion picture film as contained in the cans is in equilibrium with an atmosphere having a relative humidity of 70 to 75 per cent., and in this condition there is little danger of the formation of moisture spots, even if the film is suddenly cooled. In case negative film is exposed under very moist conditions so that the emulsion coating of the film is in equilibrium with an almost saturated atmosphere, and especially at high temperatures, it is necessary to dehydrate the film before repacking, so as to restore it to a condition approximately that existing when it left the factory, in order to eliminate the possibility of the formation of moisture spots as the result of condensation and prevent any possible loss of the latent image. A convenient method of drying out film is to rewind the roll loosely and place it in a closed metal container containing either old newspapers which have been dried out in an oven and which are hygroscopic, or asbestos wool which has been previously soaked in a saturated solution of calcium chloride and then thoroughly dried out on a shovel or sheet of tin over a fire. The film should be allowed to dry out overnight, then rewound tightly if necessary, and immediately sealed in the original container. When the calcium chloride becomes thoroughly moistened it should be re-dried over the fire.

6. Ross, F. E., *Acro*, May 3, 12 96 (1920).

7. Cousin, E., *Bull. Soc. Fran. Phot.*, Oct. 1918, p. 27.

8. Sheppard and Elliott, *Ind. and Eng. Chem.*, 30 777 (1918).

7. Senior, *Edgar*, 6: 1, 65-66 (1912).

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